

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN AND RELATING TO TUBE END SEALING DEVICES

(71) We, TUTHILL PUMP COMPANY, a corporation organised under the laws of the State of Delaware, United States of America, of 12500 S. Crawford Avenue, Chicago, Illinois 60658, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to devices for insertion into and sealing of the end of a tube having a deformable wall particularly but not exclusively for use in testing the tube.

According to the invention there is provided a device for insertion into and sealing of one end of a tube having a deformable wall comprising a body having a terminal portion for insertion into the end of the tube and an axial bore extending through the terminal portion, a stem axially movable in the bore and in fluid-tight relationship with the bore, actuating means secured to the stem adjacent a first end of the stem remote from the free end of the terminal portion of the body for moving the stem between a first and a second position and wherein an end portion of the second end of the stem extends beyond the free end of the terminal portion of the body and carries an actuator member which, upon axial displacement of the stem towards the first position, causes an anchoring member on the stem to move radially outwards for forming an internal recess in the tube, and the stem additionally carries a sealing means which, upon said axial displacement of the stem towards the first position is urged radially outwards for forming a fluid-tight seal between the tube and the stem.

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, of which:

Figure 1 is a longitudinal view showing a device according to the invention in the normal or disengaging position;

Figure 2 is a longitudinal view of another embodiment of the invention showing the

device in the tube engaging and sealing position, and

Figure 3 is a partial end view of the device pictured in Figure 2.

Referring to the drawings, wherein like numerals of reference designate like elements throughout the several views, and specifically to Figure 1, the device 2 is shown with a body portion 4 having an axial bore 6 extending throughout its entire length. Shoulder portions 8 of body member 4 provide an abutment surface when the device is inserted into thin-walled, deformable tube 10. The bore 6 has disposed therein an axially movable stem 12 in close tolerance relation except for the major portion of the enlarged section of body member 4, the reason for which will be apparent. Stem 12 has threaded end 14 and enlarged end 16 which projects beyond body member 4 through which is disposed pin 18 by which handle 20 is secured to the stem. Between the end surface 22 of handle 20 and the end shoulder 24 of body member 4, there is provided a cam washer 26 to provide a camming surface for handle 20 when it is pivoted through an arc of 90 degrees as will hereinafter become apparent.

End surface 24 of body member 4 has counterbore 28 in which is disposed a sealing member such as O-ring 30 to provide a fluid-tight seal between stem portion 16 and bore 6. Threaded stem end 14 has slidably disposed thereon a sealing means 32, anchoring member 40 in the form of a split ring, actuator member 34 in the form of a ring and spacer member 42. Sealing means 32, such as an O-ring, abuts end 36 while actuator member 34 is in spaced relationship in the normal position from the end 36 of body member 4. It will be noted that actuator member 34 has an inclined surface as at 38 on which is disposed the anchoring member 40. The spacer member 42 disposed on the stem end 14, having protruding end walls 44 and being in spaced relationship with actuator member 34, provides the means whereby the split ring 40 is urged up the incline 38 into anchoring or locking position. Two lock nuts 46 are threadably secured to stem end 14 so as to retain actuator member 34, anchoring

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member 40 and spacer member 42 in the relative position shown in Figure 1.

Referring to the remaining Figures it is quite clear that when the handle 20 is rotated about the pivot point defined by the pin 18, the stem 12 is axially moved to the left as viewed in Figure 2 thereby moving actuator member 34 to the left, causing the compression of O-ring 32 and forcing same into sealing engagement with the internal wall of the tube. At the same time, the spacer member 42 is also being urged to the left as viewed in Figure 1 and the projecting portion 44 acts upon the split ring 40 to drive it up the sloping wall or incline 38 of actuator member 34. This causes the ring 40 to engage the internal wall of the deformable tube to form an internal groove and an external bead to anchor the stem securely in place within the tube.

The tube is now ready to be tested and a test fluid may be introduced at the opposite end, or when it is desired that the test fluid be introduced via the device, a longitudinal groove is provided in the stem to communicate with a pipe port opening in the body of the device which in turn may be connected to a fluid supply source. Referring specifically to Figure 2, in this embodiment body member 48 is provided with a threaded pipe port opening 50 which communicates with the interior bore or chamber 6. The stem 52 is provided with longitudinal groove, channelway or slot 54 substantially from a point immediately below the pipe port opening 50 to the end thereof 56. The operation of both devices is the same and the only difference is that the device of Figure 2 allows for the introduction of a fluid through the device by means of the orifice 50 and channelway 54, which as is readily apparent, communicates to the interior 58 of tube 60.

It will thus be seen that one merely need slip the device as shown in Figure 1 into the tube to be tested with the handle 20 in the unlocked or open position. Once in position, the handle 20 is rotated through an arc of 90 degrees to a locked position as shown in Figure 2 which causes O-ring sealing and the formation of an internal groove which satisfactorily anchors the device in place within the hollow, deformable tube. To withdraw the device the opposite sequence of steps is followed and because of the resiliency of the O-rings and the spring memory of the split ring 40, the split ring 40 retreats down the slope 38 to assume the position shown in Figure 1. The device may then be removed from the tube without difficulty.

WHAT WE CLAIM IS:—

1. A device for insertion into and sealing of one end of a tube having a deformable wall comprising a body having a terminal portion

for insertion into the end of the tube and an axial bore extending through the terminal portion, a stem axially movable in the bore and in fluid-tight relationship with the bore, actuating means secured to the stem adjacent a first end of the stem remote from the free end of the terminal portion of the body for moving the stem between a first and a second position and wherein an end portion of the second end of the stem extends beyond the free end of the terminal portion of the body and carries an actuator member which, upon axial displacement of the stem towards the first position, causes an anchoring member on the stem to move radially outwards for forming an internal recess in the tube, and the stem additionally carries a sealing means which, upon said axial displacement of the stem towards the first position is urged radially outwards for forming a fluid-tight seal between the tube and the stem.

2. The device as claimed in claim 1 wherein the anchoring member is a split ring and the actuator member is a ring having an end portion of decreased diameter supporting said split ring and a conical surface along which the split ring is pushed and wherein the sealing means is disposed between the actuator ring and the free end of the terminal portion of the body.

3. The device as claimed in claim 2 wherein a spacer member is additionally provided on the end portion of the second end of the stem which, upon actuation of said actuating means, forces the split ring along the conical surface for forming an internal groove in the tube and urges the actuator member into engagement with the sealing means for forming said fluid-tight seal.

4. The device as claimed in claim 3 wherein said end portion of the second end of the stem is threaded and, provided with lock nuts to retain the spacer member and the actuator member on the stem and the actuating means is pivotally secured to the stem.

5. The device as claimed in claim 4 wherein the body has an enlarged portion adjacent the terminal portion to provide shoulders against which the end of the tube may abut.

6. The device as claimed in claim 5 wherein the first end of the stem extends beyond the body and a camming surface washer is provided between the body and an adjacent and contacting surface of said actuating means and a sealing O-ring is provided to form a fluid-tight seal between the body, cam washer and stem.

7. The device as claimed in claim 6 wherein the stem has an axial bore in a portion thereof extending from that portion of the stem in register with the enlarged portion of the body to the second end of said stem.

8. The device as claimed in claim 7 wherein the body has an opening communicating the stem bore to the outside of the body for connection to a fluid supply.

5 9. A device substantially as herein described and with reference to the accompanying drawing.

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COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale

